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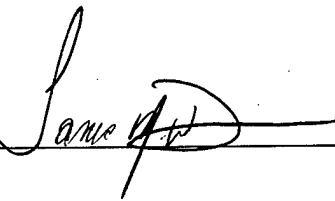
Denying Access to Commercial Communications Satellites

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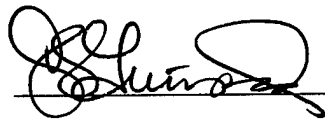
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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature 

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Abstract of Denying Access to Commercial Communications Satellites

The commercialization of space has considerably changed the playing field within satellite communications. No longer is space owned and used solely by nation states. Many satellites, particularly communications satellites, are privately owned and operated and are used by both the private and military sectors. Commercial systems such as Orion, Panamsat, Iridium and Globalstar will provide the U.S. military and its potential adversaries with a relatively inexpensive and highly effective means to increase the command, control and communications (C3) capabilities of their respective forces. Because of this dual use of commercial communication satellites, what was once just a commercial satellite has the potential to become a military target. The Joint Task Force (JTF) Commander may want to deny or impede an adversary's access to commercial satellite communications in order to disrupt his C3 capabilities. In this paper, I will examine the application of force against commercial communication satellites applying the implications of the diverse ownership of communication satellites and the current treaties and laws.

Thesis

The commercialization of space has considerably changed the playing field within satellite communications. No longer is space owned and used solely by nation states. Many satellites, particularly communications satellites, are privately owned and operated and are being used by both the private and military sectors. Because of this dual use of commercial communication satellites, what was once just a commercial satellite has the potential to become a military target. A Joint Task Force (JTF) Commander must establish criteria for deciding which type of force, if any should be used to operationally deny an adversary's access to commercial satellite communications. Intertwined in this process are three factors that must be considered. First, does the use of force facilitate or hinder obtaining the desired end-state. Secondly, does the use of force help to shape the battlefield so that the military objectives can be accomplished. And finally, does the selected use of force fall within legal boundaries. In this paper I will examine the application of force against commercial communication satellites applying the implications of the diverse ownership of communication satellites and the current treaties and laws. The use of force against a commercial satellite communications system may be legal however, its employment will be very restrictive based upon the imperative to avoid excessive damage.

Introduction

Space is no longer a place just for governmental activity. More and more, particularly in the arena of communications, space is becoming commercialized. In the past, space was virtually a cooperative venture between States. However, today many of those ventures and planned endeavors are being privatized. "In 1996, for example, commercial space revenues exceeded government space expenditures for the first time."¹ Commercial satellite communications

(SATCOM) capabilities have surpassed most military's' abilities to provide adequate SATCOM connectivity.

The well documented use and success of SATCOM during Desert Shield/Storm has proven that SATCOM is a valuable force multiplier. Very few countries - the U.S., UK, and France - have single use military satellites for communications. Additionally, only the U.S. can afford global military only systems. The DoD spends approximately \$160 million per year on national and international satellite services.² Most countries are advocating and using dual use (civil-military) technology to provide SATCOM services to their military forces. Commercial systems such as Orion, Panamsat, Iridium and Globalstar will provide the U.S. military and its potential adversaries with a relatively inexpensive and highly effective means to increase the command, control and communications (C3) capabilities of their respective forces.³

To select the most effective means to disrupt an adversaries' use of commercial SATCOM the JTF staff must conduct a careful examination of the applicable space treaties and international law. In addition, they must develop an understanding of the composition of commercial SATCOM organizations. What was previously a relatively clear picture of the number and types of players in space communications has grown more complex with the explosion of commercial entities into the SATCOM world.

The World of Commercial SATCOM

The commercialization of space is a result of several catalysts. The first of which is the widespread decrease in national contributions to space. Another contributing factor is the global nature of world economics and information interdependencies leading to the development of strategic commercial alliances. And finally, the commercialization of space has proven to be economically viable for the commercial world. According to the "State of the Space Industry,

1997 Outlook", the space industry's revenues are expected to exceed \$100 billion by the year 2000.⁴

International consortiums, based on international cooperation and implementation, operate the oldest communication satellite constellations - International Satellite Organization (Intelsat) and the International Mobile Satellite Organization (Inmarsat). Intelsat, which currently has over 140 member States, was established in 1964 under the auspices of the UN to provide space segment on a commercial basis for international public telecommunications.⁵ The Inmarsat organization, established in 1979, has over 85 member States. Inmarsat provides communications for maritime, aeronautical and land based mobile users. The users of both systems include members and non-members of the respective organizations. Virtually anyone with the money and the correct equipment can use these systems. All users agree to use the systems for peaceful purposes, which is widely interpreted to mean for non-aggressive purposes.

Aside from the global organizations, there are a number of regional SATCOM organizations including EUTELSAT⁶, ARABSAT⁷, and ASIASAT⁸. Each has similar purposes, which are to provide a regional point to point communication system for international and domestic public telecommunication services and specialized telecommunication services. Additionally, each organization is State based and provides services to all who desire service, have money and the compatible equipment. Currently there are initiatives to privatize many of these systems.

The final type of organization is the private corporation. A private company in one country may solely own a SATCOM company or it may be an international venture. Typically, these SATCOM constellations provide worldwide services. Newer and planned systems include Panamsat, Iridium, Orbcomm, Globalstar, Teledesic, and Spaceway. Many of these systems will provide worldwide connectivity and services such as data transmission, telephone and fax

services for the roaming user at a nominal cost. A phone resembling today's cellular phone will soon provide the capability for worldwide communications. For this reason, the proliferation of handsets is expected to be in the hundreds of thousands.⁹ This technology will be useful for enabling effective C3 for any commander on the battlefield. In fact, DoD is presently considering purchasing services from Iridium LLC to supplement military satellite capabilities. Of significance, adversaries can also gain access to this technology by simply purchasing services and equipment. The primary goal of these organizations is profit.

Each type of commercial ownership scheme described above has a different motivation and governing structure. The first two types are currently government based and were implemented primarily to provide public and international telecommunications services. Additionally, each is directly bound to all of the international space laws and treaties. The later type, corporations, are indirectly bound by the same international laws and treaties and by nature are profit oriented. Understanding the subtle differences of ownership, organizational goals and motivations may facilitate determining how best to deny access to an adversary.

Applicable Space Treaties, Laws, and Policies

Space treaties and international laws were developed in the 1960s and 70s to regulate States' conduct with respect to the use of space. These agreements have helped to maintain a cooperative spirit in space usage. A number of these international treaties and conventions affect the feasibility of targeting commercial communication satellites or portions of a space system to operationally deny access to an adversary. In addition, basic precepts of customary international law regarding the use of force and neutrality bear on the issue of using force against commercial satellites. The National Command Authority (NCA) in guiding the JTF Commander must use

these laws and treaties as criteria to determine the type of force to be used against a commercial communications satellite system. A brief overview of these principles follows.

The Outer Space Treaty

The Outer Space Treaty of 1967 was established under the auspices of the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) was intended to serve as the foundation of international space law. The articles that are most applicable to evaluating rules for conducting operations against commercial SATCOM assets are the preamble and articles IV, VI, VII, and VIII.

Contained within the preamble is the qualification that States Parties shall "...contribute to broad international co-operation in the scientific as well as the legal aspects of the exploration and the use of outer space for peaceful purposes..."¹⁰ The term **peaceful purposes** has been subjected to several interpretations. "Both the UN Charter and international law require that the use of outer space not involve the use of armed force unless the use of such force is in the "common" interest or for self-defense."¹¹ The U.S.' position is that the term 'peaceful purposes' means non-aggressive activities. And non-aggressive military activities in space are permitted unless they are specifically denied.¹² This is analogous to the treatment of the high seas under international law as reserved for peaceful purposes, which is also interpreted to allow non-aggressive military activities.¹³

To this end many states have used space products such as communications and imagery in the conduct of peace and humanitarian operations as well as war. During Desert Storm the coalition partners did use Intelsat and Inmarsat to conduct operations. This was probably not a concern since Desert Storm was a UN sanctioned operation under Article 51.¹⁴ However, during a UN sanctioned action, consortium member(s) could be denied access to Intelsat and/or Inmarsat if

they were acting against the UN coalition. The likelihood of this occurring is dependent upon the scale of the conflict, political considerations and the threat posed by such usage.

Article IV protects mankind against warfare in outer space. This article explicitly prohibits placing into orbit nuclear weapons or any other kinds of weapons of mass destruction.

Additionally, the use of the moon or other celestial bodies shall be for peaceful means. Article VI declares that the States are responsible for activities carried on by governmental agencies as well as non-governmental entities and must ensure that they are conducted in accordance with the provisions contained within the articles of the treaty. This article covers the activities of multinational organizations such as Motorola the owner of Iridium and ESA who owns EUTELSAT. The interpretation has been that States have an indirect responsibility to control the activities of non-governmental organizations.¹⁵ If a non-governmental entity commits an illegal act, such as the violation of the law of neutrality, the State's responsibility may transform from indirect to direct responsibility. And the State would likely have a responsibility to correct the actions of the non-governmental entity.

Article VII states the principle of State international liability in respect to launching objects into space. The State's ownership matters, i.e. jurisdiction and control, concerning objects that are launched into space are outlined in Article VIII. This article further delineates State jurisdiction and the State's direct and indirect responsibilities for the activities of non-governmental entities. At first glance, the Outer Space treaty may appear to be extremely restrictive. However, it does provide a significant capability to help pin the rose of responsibility on the correct entity (State). This is particularly important in the divergent world of ownership within commercial SATCOM.

The Convention on Liability

This Convention, ratified by UNCOPUOS in 1972, expands on the Outer Space Treaty descriptions of responsibility and liability. The intent of the agreement is to define the standards for liability, the process for dispute resolution, the limitations on damages and the categories of damages. These standards apply to damage on the land, sea, or in the air caused by space related activities.¹⁶ The U.S. is a party to this treaty.

Anti-Ballistic Missile (ABM) Treaty

The ABM treaty is a bilateral agreement between the U.S. and the Soviet Union signed in 1972 to limit defense systems designed to counter strategic ballistic missiles or their elements in flight trajectory. The development of space-based ABM technology is also prohibited. This was an attempt by both nations to control the proliferation of offensive strategic weapons. Currently, the U.S. is seeking to amend the treaty to clarify the difference between theater ballistic missiles and ABMs and to add the former Soviet states - Russia, Ukraine, Kazakhstan and Belarus.¹⁷

Law of Neutrality

The law of neutrality is reflected mainly in customary norms of international law. This law attempts to distinguish between belligerents and neutral parties in a conflict in an effort to localize the conflict and minimize the impact on non-belligerents, including their right to engage in international commerce.¹⁸ A neutral state has the right and obligation to abstain from participation and remain impartial during a conflict. A neutral who provides commerce, i.e., SATCOM access for the purpose of conducting war, to an adversary is potentially compromising their obligation to abstain from participation and therefore risks losing their neutrality status.¹⁹

Applicable Federal Laws

U.S. law provides authority for the President, in the interest of national security or defense, to close or authorize the use or control by a department of the Government of any station used for radio communications.²⁰ This would include commercial SATCOM systems that are owned and registered by U.S. companies. If the provisions of this law were enacted the President must appropriately compensate the owners of the systems. This law would permit the DoD, for a price, to deny the use of U.S. commercial SATCOM to an adversary. However, some of the constellations such as Iridium or Orbcomm are partially owned by third parties. The question then becomes, will this law apply to multinational commercial ventures and how will the U.S. consider the equities of the other countries/participants?

U.S. law prohibits the malicious interference with the operation of a satellite.²¹ This type of action would include spoofing or jamming the satellite control link or jamming the communications uplink and/or downlinks. The law does not prohibit the lawful investigation, protective or intelligence activity by law enforcement or intelligence agencies of the U.S. To conduct this type of engagement the JTF commander, through the appropriate channels, would have to obtain permission from the NCA.²²

National Space Policy (September 1996)

In the first space policy issued since the end of the Cold War, President Clinton committed to a strong space program and addresses both U.S. national and civil security requirements. He states that the U.S. National security space activities shall contribute to national security by "...countering, if necessary, space systems and services used for hostile purposes...."²³ Additionally, within the guidelines for the Defense space sector, he states that ...the United

States will...maintain space control to ensure freedom of action in space and if directed, deny such freedom of action to adversaries.”²⁴

Principles for Rules of Engagement

After taking into consideration the principles described above, the operational commander will need to fashion appropriate rules of engagement that will provide guidance for denying an adversary's access to commercial SATCOM. The basic law of armed conflict that will guide the process includes:

1. **Military Necessity** – targeting not prohibited by LOW and of a military advantage. **Military Objective:** persons, places, or objects that make an effective contribution to military action.
2. **Humanity or Unnecessary Suffering:** minimize **unnecessary suffering** – incidental injury to people and **collateral damage** to property.
3. **Proportionality:** loss of life and damage to property incidental to attacks must not be excessive in relation to the concrete and direct military advantage expected to be gained.
4. **Discrimination or Distinction:** Discriminate or distinguish between **combatants** and **non-combatants; military objectives and protected people/places.**²⁵

The consideration of space asset's relationship to the critical communications infrastructure of the adversary, the civilian population, particularly those in neutral countries, and any coalition members should be considered when applying these principles. The communications services provided by the satellite could support extensive civilian purposes such as basic long distance phone services, emergency services, disaster relief, international banking, private communications as well as the enemy's C3.

As the foregoing discussion shows, the laws, agreements, treaties and policies pertaining to space and communications do not absolutely prohibit the use of force against a commercial communications satellite. However, they do present some obstacles because the commercial satellites are typically dual use and jointly owned.

Operational Denial

The final step is for the NCA and the JTF commander to evaluate the feasibility of employing a particular type of engagement using the applicable laws and treaties and satellite ownership as the criteria. There are several methods that can be employed to deny an adversary access to commercial SATCOM capabilities. Each method that will be discussed can be used to directly attack a segment of the space system. A communication space system consists of three segments. The segment that is hardest to attack is the space segment - the satellite. The control segment is a communications link to and from the satellite to a control station. The link is used to conduct satellite station keeping functions and check the status of the satellite. The final segment is the ground segment, which is probably the easiest to attack. This segment consists of the earth terminals, tracking stations and the launch facilities.

Space Segment

Nuclear Weapons

A nuclear weapon can be launched from the ground using ICBMs. However, employing nuclear weapons in space, particularly in low earth orbit, may cause radiation to be trapped in the earth's atmosphere causing collateral damage to unintended objects.²⁶ Additionally, the use of a nuclear weapon may precipitate like retaliation, possibly escalating the conflict. In short, the use of a nuclear weapon to engage a commercial satellite would cause excessive collateral damage and probably undesired international reaction.

Anti-Satellite Technology (ASAT)

This technology falls into two categories, kinetic weapons and directed energy weapons. The U.S. does not consider ASATs to be weapons of mass destruction; however, the international community may because the employment of an ASAT can result in the destruction or disabling

of a satellite system. Kinetic weapons permanently disable targets by impact of a mechanical shock. Such an act conducted against a commercial satellite could cause excessive collateral damage and bring into play considerations contained within the Liability Convention. Excessive damage could include the disruption of businesses, international banking, disaster relief and civilian communications (international and national) severely impacting the ability of civilians, businesses and governments to function effectively and safely. Because of the global nature of many of the commercial SATCOM systems, creating a gap in the telecommunications network would not just effect the adversary but may adversely effect neutrals and other non-combatants.

A directed energy weapon such as a laser can temporarily blind a satellite or possibly destroy it.²⁷ Again, issues of international concerns, excessive collateral damage and liability should be considered. In a recent test - Oct 1997 - of the MIRACL ground based laser conducted by Army Space and Missile Defense Command the laser was used against the USAFs MSTI-3 satellite. The Russian Foreign Ministry expressed concern over whether this test was consistent with the ABM treaty.²⁸ The primary reason for their concern is the potential for ASAT technology to be used as a substitute for an anti-ballistic missile.

If the satellite is partially owned and/or operated by a neutral State the law of neutrality must also be considered. Damaging or destroying a satellite owned by a neutral would be in violation of the law of neutrality if the neutral was not aiding an adversary. A direct attack against a satellite using an ASAT although technically feasible raises legal issues of excessive collateral damage, neutral rights and controversy in terms of the ABM Treaty. The international implications of widespread collateral damage would have to be considered. A State may decide that it is in its political best interests not to attack when such damage is possible.

Control Segment

The satellite may be unable to accomplish its designated tasks and may do anything from spinning out of orbit to shutting down if the control segment of a satellite is altered or impeded. In the future satellites may be able to operate autonomously for long periods of time and not require as many commands from a ground station. If this occurs attacking the control link may not be as effective in the future. Jamming of the control segment can be accomplished using electronic countermeasures directed either towards the satellite control uplink or downlink. Jamming is considered to cause indirect damage. However, if permanent damage is caused to the space vehicle because of the inability to receive commands this would be considered direct damage raising the issue of potential liability with respect to neutral interests.

Another method for attacking the control link is spoofing. Spoofing, the most discrete and undetectable method, of the control link means entering incorrect data or false commands into the control link to disrupt the satellite tasking, to redirect the satellite or perhaps to shut it down. Because spoofing directly alters the commands sent to the satellite, this may be considered direct damage and the U.S. could incur liability. As with the space segment, the requirement to minimize collateral damage is another consideration. And finally, someone should consider whether the destruction of the satellite is a necessary and proportional use of force relative to the operational objectives and/or threats presented by its usage.

Ground Segment

The ground segment, as noted earlier, is comprised of several elements- the launch facilities and earth stations to include handsets. If the earth terminals were destroyed, communication services would only be interrupted and the effect may be localized. Destroying a launch facility would negate the ability of the enemy to launch additional satellite capacity. Destroying the

tracking stations would slow the satellite operator's ability to track and control a satellite. However, it will not directly affect the enemy's ability to communicate. The second way to deny access to the ground segment is to jam the satellite downlink or transmitter uplinks. This method would localize the effect and minimize collateral damage. Again, the issues of collateral damage and neutrality should be considered. However, both of these methods, destruction and jamming, may meet the standards of necessity and proportionality.

Passive Activities/Negotiations

To negotiate a denial of services it is important to know who owns the satellite constellation and which country (s) is responsible for the satellite's registration. This information will provide a starting point for assessing the implications of interfering with the system. For instance, if an adversary is using Intelsat or Inmarsat individual organizations the UN may be the organization to obtain the denial of service. As stated implicitly or explicitly in their charters both systems are to be used for peaceful means. If a regional consortium owns the satellite then the individual States involved should be consulted and asked to deny service to the adversary. If the satellite owner is an U.S. corporation then domestic law²⁹ may be applicable for denying services. However, this method may require the expenditure of funds to compensate the owner for loss of revenue. These negotiations would essentially establish a communications embargo aimed at denying access to commercial SATCOM.³⁰

If the satellite constellation is a multinational corporate venture, the U.S. may be able to persuade the responsible (country of registration) State to prevent its companies from providing services to an adversary in support of his warfighting capability.³¹ This approach could be particularly useful for obtaining a negotiated denial of space assets to an adversary if a SATCOM asset belongs to a commercial entity that is registered through a 'neutral' State. The

use of a SATCOM asset owned or registered through a neutral State by a belligerent(s) to conduct warfighting could be considered illegal under the law of neutrality. In this instance, if the 'neutral' State knows of the belligerents use, it is no longer impartial or abstaining from participation.

Since the political and economic motivations for providing service may differ, the probability of successfully negotiating a denial of services will vary. If negotiation tactics are being employed in support of a multi-lateral engagement, then an atmosphere of cooperation may be present and the probability of success may increase. If the U.S. is acting unilaterally, support may be difficult to obtain. Negotiations will take time and depending on the nature and intensity of the conflict, this may make such an approach impracticable. However, if time permits a negotiated denial would be preferable and because it aims the denial directly towards the adversary there would be an inherent reduction in the risk of collateral damage and U.S. liability.

Engaging the space segment with an ASAT is the most direct and perhaps the most effective approach - if a satellite is destroyed it cannot be used. However, this method is potentially the most problematic under the ABM treaty and customary norms regarding the use of force. The next step would be to engage the control segment. This approach although not as lethal as destroying the satellite may cause direct damage to a satellite and may inadvertently deny service to neutrals and cause excessive collateral damage.

Engaging the ground segment particularly the earth stations and receivers localizes the effect thereby facilitating greater control over collateral damage. However, this type of localization may not have the desired effect on the C3 capabilities of the adversary. Negotiations are the most benign approach. While localizing the denial to just the adversary, negotiations can be used to

minimize collateral damage and potential liabilities. This approach could be costly both in time and money and may not, in the end, produce the desired effect.

Most of the approaches discussed are not specifically prohibited and are therefore legal insofar as they are directed at the enemy.³² However, each method risks the precipitation of excessive collateral damage and liabilities with regards to neutral rights. In all approaches the U.S. must be able to demonstrate that a satellite provider is providing an adversary with SATCOM capacity which is being used to contribute to the adversary's warfighting capability.

Conclusion

The commercialization of space has increased the potential and desire for the dual use of commercial satellite communications. Previously unavailable communication services are now readily available and affordable for the U.S. as well as its potential adversaries. This change has blurred the distinction between the belligerent and the neutral, the combatant and the non-combatant complicating the use of force to deny satellite communications to a belligerent. The task of determining the rules of engagement for denying an adversary's access to commercial SATCOM is not a simple process. To accomplish this task the JTF commander may have to apply a sophisticated decision process to ensure that all of the appropriate criteria are applied and that careful consideration is given to the increased potential for excessive collateral damage. To determine the most effective means to deny the adversary the use of commercial SATCOM the following items of consideration should be addressed:

1. **Determine the ownership/registration of the space asset to identify which type of enterprise is involved, i.e. an international consortium (Intelsat or Inmarsat), a regional consortium, an U.S. corporation, or an international venture.** The JTF commander can use this information to assess the possibility of using force or passive measures to deny access to the adversary.
2. **Are any of the owners considered members of a neutral State? Because of the different types of ownership structures, the possibility of a neutral being involved with the system is**

increased. The method of engagement that is chosen must balance the requirement to allow a neutral to conduct international commerce against his possible violation of neutral status.

3. Who are the potential users of the satellite system and are any of them considered neutrals or non-belligerents? Are any members of the coalition using the SATCOM asset?

Many of the users of a dual use system may be non-belligerents or neutrals who are using the systems to support various activities such as, telemedicine, business transactions, disaster relief activities, and normal communications. The loss or disruption of a satellite system could cause undue injury to persons or property. In addition, both the coalition and the adversary may be using the same system (s).

4. Applying the principles of necessity and proportionality, which segment of the space system can be more effectively targeted to reduce the risk of excessive collateral damage and negative effect to neutrals? As discussed earlier, the system can be targeted at different points. Targeting the space segment and perhaps the control segment increases the risk for excessive collateral damage. Targeting the ground segment can create a more localized effect reducing the amount of collateral damage and effect to neutrals. The passive alternatives directly target the adversary reducing the possibility of excessive collateral damage.

5. Which Space laws, treaties or agreements will apply? What limitations do they impose under the circumstances? The laws do not absolutely prohibit the direct engagement of a satellite system however, they do provide limitations i.e., the placement of nuclear weapons and weapons mass destruction in orbit is prohibited. However, will an ASAT fired from space or an airplane violate the law?

6. Will the method chosen risk the accomplishment of the political and military objectives? The type of engagement that is chosen must support the successful obtainment of the military objective.

Using the applicable laws and treaties as the decision criteria, the two primary concerns for targeting a commercial communications satellite system are the possible violations of the law of neutrality and the distinct possibility of causing excessive collateral damage. The global nature of commercial SATCOM will make it extremely difficult to correctly gauge the full extent of damage to a SATCOM system and its end users (belligerents, neutrals and non-combatants).

The NCA and the JTF commander must ultimately weigh the risk of violating these laws/principles against the direct military advantage that could be gained before choosing how to target or even if to target a commercial satellite communications system.

NOTES

- ¹ Sam J. Tangredi, "A Naval Concepts-Based Vision for Space." Proceedings, January 1999, 50.
- ² Richard A. Morgan, "Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and "Peaceful Purposes"." Journal of Air Law and Commerce, September/October 1994, 28.
- ³ Steven Lambakis, "The United States in Lilliput: The Tragedy of Fleeting Space Power." Strategic Review, Winter 1996, 33-34.
- ⁴ Katherine M. Peters, "Space Wars." Government Executive, April 1998, 13.
- ⁵ H.L. van Traa-Engelman, Commercial Utilization of Outer Space. (Boston, MA: Kluwer Academic Publishers, 1993), 146.
- ⁶ Members of EUTELSAT include – Austria, Belgium, Denmark, France, Germany, Italy, Ireland, Netherlands, Norway, Spain, Sweden, Switzerland, and the UK
- ⁷ Members of ARABSAT include – Saudi Arabia, Libya, Egypt, Iraq, Sudan, Somalia, Lebanon, Kuwait, U.A.E., Qatar, Bahrain, Jordan, Syria, Oman, Algeria, Yemen, South Yemen, Tunisia, Mauritania, and P.L.O.
- ⁸ Members of ASIASAT include China, Korea, and the Philippines.
- ⁹ Barry Miller, "Satellites Frees the Mobile Phone." IEEE Spectrum, March 1998, 27-28
- ¹⁰ Nathan C. Goldman, American Space Law: International and Domestic (San Diego, CA: Univelt, Inc, Publishers 1996), 233. Outer Space Treaty, 1967
- ¹¹ Richard A. Morgan, "Military Use of Commercial Communication Satellites: A New Look at the Outer Space Treaty and "Peaceful Purposes"." Journal of Air Law and Commerce, September/October 1994, 69.
- ¹² LtCol Richard A. Barfield, Operational Law Handbook (Charlottesville, VA: The Judge Advocate General's School 1998), p6-11.
- ¹³ Law of the Sea Article 88 states that "The high seas shall be reserved for peaceful purposes."
- ¹⁴ Katherine M. Peters, "Space Wars." Government Executive, April 1998, 18.
- ¹⁵ The interpretation has been that States have an indirect responsibility to control the activities of non-governmental organizations. In his revisit of Article VI, Bin Cheng states: "States must use diligence in accordance with prevailing International standard to prevent, suppress, or repress any violation of their (other states) rights taking place in areas subject to its effective jurisdiction especially those of non-officials." Bin Cheng, "Article VI of the 1967 Space Treaty Revisited: "International Responsibility", "National Activities" and "The Appropriate State." Journal of Space Law Volume 26 No.1 1998, 12.
- ¹⁶ Nathan C. Goldman, American Space Law: International and Domestic (San Diego, CA: Univelt, Inc, Publishers 1996), 80.
- ¹⁷ LtCol Richard A. Barfield, Operational Law Handbook (Charlottesville, VA: The Judge Advocate General's School 1998), p6-12.

¹⁸ If a State is a member of the UN and the UN Security Council has authorized an enforcement action, members of the UN are obligated to assist/support the UN and thus be effectively denied neutral status.

¹⁹ Navy Department, The Commander's Handbook on the Law of Naval Operations, NWP 1-14M (Norfolk, VA: 1995), 7-1 – 7-5.

²⁰ U.S. Code Title 47 Telegraphs, Telephones, and Radiotelegraphs, sec. 606c (1994).

²¹ U.S. Code Title 18 Crimes and Criminal Procedures, sec. 1367 (1994).

²² MAJ Anthony J. Russo, The Operational Denial of Commercial Space Imagery (Ft Leavenworth, KS: U.S. Army Command and General Staff College, 1996), 21.

²³ President, "National Space Policy," (19 September 1996), 5.

²⁴ *Ibid*, 6.

²⁵ LtCol Richard A. Barfield, Operational Law Handbook (Charlottesville, VA: The Judge Advocate General's School 1998), p7-21.

²⁶ Paul B. Stares, Space and National Security (Washington, DC: The Brookings Institution 1987), 75.

²⁷ *Ibid*, 76-77

²⁸ Michael A. Dorheim, "Laser Engages Satellite With Questionable Results." Aviation Week and Space Technology, October 27, 1997, 27.

²⁹ U.S. Code Title 47 Telegraphs, Telephones, and Radiotelegraphs, sec. 606c (1994).

³⁰ UN Article 41 states that "The Security Council may decide what measures not involving the use of armed force are to be employed to give effect to its decisions, and it may call upon the Members...to apply such measures. These may include complete or partial interruption of economic relations and of...telegraphic, radio, and other means of communication, and the severance of diplomatic relations."

³¹ Nathan C. Goldman, American Space Law: International and Domestic (San Diego, CA: Univelt, Inc, Publishers 1996), 236.

³² "Outside of the arcane world of arms controllers, the United States traditionally adheres to the principle that an act not specifically prohibited by international law, including treaties, is permitted." Steven Lambakis, "The United States in Lilliput: The Tragedy of Fleeting Space Power." Strategic Review, Winter 1996, 39.

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